ELECTRONIC TECHNOLOGY - THE UNIVERSITY'S TWO EDGED SWORD

KEYNOTE SPEECH

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By

G. Wayne Clough
President
Georgia Institute of Technology

Good morning. It is a pleasure to welcome members of ACUTA to Atlanta, the city that is home to my own institution, Georgia Tech.

The topic of this conference, "Connecting Education to the Future," is a timely one. Today, the nation's colleges and universities are at once benefiting from advances in telecommunications and educational technology, yet at the same time feeling threatened by the rapid emergence of alternative methods of educational delivery. With Georgia Tech home to one of the largest collection of faculty in the nation doing research on telecommunications and computing, I periodically get the feeling that I can hear some of them sawing on the limb we are sitting on.

We are racing towards an exciting, but uncertain future, particularly as to the role to be played by the traditional university. In my remarks today I will share my thoughts on what lies ahead as well as actions needed for universities to be successful in education's evolving environment.

While well appreciated by this group, it perhaps bears repeating that the fields of telecommunications, entertainment, computing and networks are converging. This can be seen in the topics you will address at this conference. In my remarks, I will assume the connection of education to the future is defined in a broad sense when I use the word telecommunications. This is intended to refer to not only conventional telecommunications, but also subjects such as the internet, educational technology, information systems, distance learning, and electronic library access.

All of these technologies have fostered rapid change with a steadily broadening scope. Consider the following:

1. Ownership of personal computers has reached 1 out of 4 homes in the U.S.; in the Atlanta Metropolitan area, a recent survey showed as many as 65% of the households owned computers with fully 50% of these linked to the Internet.

2. Use of computers by teens is extensive, with 90 percent reportedly using this technology at least several times a week. Fully 92% of teenagers are reported to think computers will improve their educational opportunities; these computer literate teens come to education

with a different mode of thinking than past generations, with more emphasis on self-learning and interactive dialog via the network.

3. Growth of the Internet is explosive; in 1991, 4,000 networks were linked to the Internet and by 1995 more than 40,000 were connected with rapid growth occurring outside of the United States.

4. Use of electronic course delivery is growing; it is estimated that one million people received courses via video and other media this year. This figure is up considerably from previous years and approaches one tenth of the number receiving courses in traditional classrooms.

Perhaps no more dramatic illustration of the impact of new technology on education came this past week with the explosion of interest in the Mars Pathfinder mission on the internet. In many ways universities are already being transformed by these kinds of dynamics. Illustrations of some exciting developments that are either in the pilot stage or close to implementation include:

• Classrooms with video feed and electronic whiteboards that allow faculty lectures to be directly recorded, along with student notes from their own electronic pads, then immediately accessed by students' in-room computers.

• Multi-location design project interaction where team-to-team information is exchanged via electronic whiteboards and the Internet.

• On-demand learning offerings delivered directly to desktop machines at the home, office, or dorm room via the Internet.

• Instant access to knowledge through linked libraries and custom-designed search engines using personal agents that know your own preferences and needs.

• Wide-spread delivery of university services such as health care using tele-medicine.

These examples of developments in education and service delivery are paralleled by new telecommunications technology poised to improve university administrative processes and research linkages between institutions. Yet in spite of the impressive potential that lies in technological innovation, universities have been slow to capitalize in many areas, one of the central ones being in the core of academe, the classroom. In his book, *Being Digital*, Nicholas Negroponte contrasts the case of a surgeon and a faculty lecturer from the 17th century who are both transported to the 21st century. In the operating theater of a modern hospital the 17th century surgeon would recognize little and be unable to do anything. But, the 17th century faculty lecturer would feel right at home in most of today's classrooms. The lecturer's clothes might even be taken as a new wave of fashion.

Because of our slowness to respond and the pace of introduction of new technology, there are jeremiahs predicting the university as we know it is on the verge of becoming obsolete. Well-known management consultant Peter Drucker said in the March issue of *Forbes* magazine, "Thirty years from now the big university campuses will be relics. Universities won't survive. It's as large a change as when we first got the printed book...Higher education is in deep crisis. Already we are beginning to deliver more lectures off campus via satellite or 2-way video at a fraction of the cost. The college won't survive as a residential institution."

An earlier alarm for the university as we know it was sounded by Dr. Eli Nome, director of the Columbia Institute for Tele-Information, who said in his article, "Electronics and the Dim Future of the University," "... while new communications technologies are likely to strengthen research, they will also weaken the traditional major institutions of learning, the universities. Instead of prospering with the new tools, many of the traditional functions of universities will be superseded, their financial base eroded, their technology replaced and their role in intellectual inquiry reduced."

If Drucker and Nome are right, the topic of this conference, "connecting education to the future," could mean doing so without much help from the traditional university. They have a strong point, and doubtless some colleges and universities are going to be left behind in the future. Yet their analysis assumes an "either/or" scenario which neglects certain important factors. First, much of the present growth of electronic educational delivery meets a different demand than that satisfied by traditional higher education. This is evidenced by the simultaneous growth of enrollments in both the electronic and traditional educational sectors, a trend that will continue for some time into the future. Second, the "either/or" assumption does not recognize that many universities will be aggressive in use of telecommunications and educational technology in expanding outreach and in enhancing their campus-based missions. The latter observation is validated in that the exciting projects I cited earlier are drawn from efforts underway at traditional educational institutions, including my own.

In fact, universities have a number of inherent advantages over virtual education suppliers, at least for the time being. For starters, virtual institutions haven't yet found a way to field a football or basketball team. They even haven't picked up on the need for funny looking mascots and school colors that only an alumnus could love.

More seriously, there are other advantages that will hold for the traditional university for at least the next decade:

• For undergraduates students especially, time spent living on campus or nearby is a learning experience in itself--a rite of passage if you will. In this sense, the university assumes responsibility for the growth of the individual in a holistic sense.

• A virtual educational experience does not provide the opportunity for personal interaction between faculty and student. (However, I will admit this is something there may be too little of in the modern research university as well!)

• In many fields such as science and engineering, laboratories and the experiences in them are essential. Although virtual experiences can enhance the physical, they cannot replace the learning that comes by actually "doing it."

• Universities provide for faculty interaction, hands on teaching of graduate students, and facilities for research, and this forms the basis for much of the nation's knowledge creation.

• Finally, most people still place high value on the reputation of the institution where the degree is obtained. For example, while the "Western Governors Virtual University" is an interesting idea, a degree from hundreds of high-quality traditional universities has more built-in value because it comes with the name and the quality of the institution behind it.

The advantages of traditional universities are substantial and represent fundamental values that can be further enhanced by the appropriate use of telecommunications and educational technology. Yet, traditional universities also face significant challenges.

• Physical Plant and Technology Infrastructure

You can begin with the matter of the facilities and fixed assets that universities and colleges own. Nationwide, too little attention has been given to maintaining existing facilities with a resultant significant deferred maintenance problem. Using modern technology to deliver education in 50- to 100-year old classroom buildings is difficult, if not impossible. Providing adequate communications links to campus buildings that may be underserved by the basics like sewer and water, is a problem of major proportions. Finally, most conventional classrooms are configured for lectures, and in the future there will be an increasing emphasis on self-learning along with group and studio type work. Finding the means to tackle the modernization of the campus physical plant is one of the most difficult issues we face.

• Incentives versus Disincentives

Campus incentives and disincentives are another issue we have to address. Universities, and the structures they must work within, often have built-in disincentives to change. For example, what is the incentive to change from the pervasive culture of teaching by lecturing to one of reliance on self-learning, if faculty reward systems do not recognize curriculum innovation? How will outside oversight agencies accommodate a system which emphasizes less time in the classroom when there is already pressure to have more of this? Will enough flexibility exist within state regulated systems to allow public universities to compete on a level playing field with private universities? Lack of flexibility, often self-imposed, could significantly delay response by traditional institutions to the new market forces.

• The Need for Deliberate Speed

While we need to work to eliminate unnecessary barriers that slow our ability to respond, we also should respect that there are real reasons to proceed with due deliberation. In spite of the expectations of true believers, educational technology is not a panacea, nor is it going to eliminate the need for faculty. Implementation of new technology should be planned so that the focus is on improving quality, such as adding to the amount of time a faculty member can spend with students. Careful research and assessment is required and pilot programs are needed to see what works and what doesn't. Finally, successful systems should be tested for scalability to determine if pilots can really work for larger applications.

• International Issues

The Internet and telecommunications issues transcend national boundaries, and for universities and colleges with international programs this can present special problems. This past year, Georgia Tech's campus in Metz, France became the subject of a lawsuit by French language loyalists who contended our Metz homepage, and all the computer-based documents supporting this campus, had to be in French. While we had no problems with providing a French version of the homepage for the Metz campus, we did not agree with the idea that all documents here in Atlanta should be in French. We were admirably defended by lawyers from the Province of Lorraine, and in June, the case was decided in our favor. However, the case illustrates the complex international dimensions of the Internet, many of which have yet to be addressed.

• Telecommunications System Security

Finally, with growing use of networks for information transfer and access, protection of the security of systems becomes ever more important. This is one issue that transcends both traditional and virtual educational delivery. Former Georgia Senator Sam Nunn, a defense expert, is quoted as saying that 250,000 known hacker attacks are made annually on U.S. defense computing and information systems. It is not known how many of these are successful, or how many other attempts are made. While university systems are not associated with the life or death issues of our national defense, they must be secure if they are to be trusted. Solution of security issues are paramount if we are to realize the full extent of the value of telecommunications technology.

The challenges I have mentioned make it clear that the path to the future is going to require creative and resourceful efforts to provide solutions. Traditional higher education institutions and the bodies that govern them need to work together to create greater operational flexibility, appropriate resource bases and improved allocation policies. This will require internal and external change. To a large extent, universities need to remember the wisdom of the old Georgia swamp philosopher, Pogo, who said "we have met the enemy and he is us." There is much work that can, and should be, done internally.

An example of a structural issue that can be perplexing to public institutions is the division of labor within a state between universities that desire to deliver distance learning. Resolution of this problem is vital for public institutions since virtual learning providers or private schools have wide flexibility in designing their strategy to deliver distance learning. The latter institutions can pick and choose choice educational and geographic markets, charge what the market will bear, and not be concerned if they are competing with the local established state institutions.

On the other hand, public universities are often constrained to service limited geographical regions, have tight controls on the tuition and fees that can be applied, and are expected to deliver a wide variety of educational offerings. One solution to part of this conundrum is to treat the state in terms of a state-wide educational marketplace, and service it by assigning one institution responsibility for coordination of offerings for a certain segment of the market, such as engineering, business or computer science. The responsible institution, in coordination with the governing agency, then sees to the delivery of the "best practice" offerings from all of the public institutions in the state that serves the market. In this way the public system creates an advantage over private or virtual providers by allowing students access to a robust variety of courses and those that are the best from each institution.

To implement a "state-wide" market concept, public universities have to overcome an aversion to competition. One largely misplaced fear is that institution-bound students will opt for distance learning over a comparable campus offering. Most students who use distance learning will be part of the emerging market that is not presently served. That is, they represent an expanding pie, not one that is sliced into smaller pieces. In the off-chance that an institution finds campus students opting to take the "best practice" distance learning course, then this should be taken as a sign that they need to improve on-campus offerings to make them competitive.

The challenges also go well beyond institutional boundaries and extend to regulatory agencies, the federal government, and private industry. The scope of change needed will require coalitions of universities, industries and corporations and governments working together.

An outstanding example of success through cooperation exists right here in Atlanta. Our Olympic experience showed what a comprehensive approach to improving telecommunications could do, and we would do well to learn from this example.

In a speech just prior to the Olympics, Georgia Governor Zell Miller noted insightfully that while the Olympic Games would represent a remarkable historical moment in Atlanta's history, the real legacy of the Games would lie in the telecommunications investments for the Games. These were made by a collaborative effort between universities, government and industry.

Telecommunications enhancements included increasing the cellular capability in the Metro area eight-fold, and adding fiber optic trunk lines that are three times more extensive than those in New York City. On my own campus, which served as the site of the Olympic Village, a high speed communications network consisting of over 1,700 miles of fiber was installed providing full service to 130 buildings, residence halls and 86 classrooms. Finally, just prior to the Olympics, the Georgia Research Alliance and Georgia Tech opened a magnificent new building housing the Georgia Center for Advanced Telecommunications Technology on 14th Street (GCATT). GCATT, funded by state government and private entities, is designed to allow Georgia's research universities to partner with industry and government to provide comprehensive solutions to telecommunications infrastructure for society.

The end result of our Olympic improvement program is a great example of the utility of partnerships between industry, government and universities. Of course, not everyone can have an Olympics to serve as a catalyst between these groups, but the lesson learned is that coalitions with ambitious goals get more done than single entities with small goals.

Organizations like ACUTA are especially successful in making a difference because you bring together representatives from the diverse spectrum of institutions to discuss common issues. I would encourage you to consider how you can create a national dialog about how colleges and universities can adapt to the new environment being created by advances in telecommunications and educational technology. While competition with electronic educational suppliers will stimulate needed rethinking of our missions, our colleges and universities are a national resource that can keep our nation competitive in a global economy if they are appropriately adapted to utilize advanced electronic technology

To conclude, I would like to thank you for allowing me to share some of my ideas with you. Although we face a challenging future, I believe we can use advanced telecommunications and educational technology to offer the nation's citizens a richer and more robust array of educational opportunities than was ever possible before. Georgia Tech looks forward to working with ACUTA's members to get this done right.